

Having thus described the invention, we claim:

Having thus described the invention, it is now claimed:

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1. A combined spring brake modulating relay valve comprising:

a housing having a control port, supply port, delivery port, exhaust port, and a chamber formed therein in selective communication with the supply port adapted to receive pressurized air from an associated reservoir, the delivery port adapted to communicate with associated spring brakes, and the exhaust port adapted to communicate with ambient;

15 a valve member in the chamber normally biased to preclude communication between the supply and delivery ports and permit communication between the delivery port and the exhaust port;

a first piston assembly received in the housing and movable in response to pressure from the control port;

20 a second piston received in the housing and operatively associated with the first piston for selective movement relative to the first piston and selective movement with the first piston;

25 primary and secondary ports communicating with opposite faces of the second piston and communicating with primary and secondary brake circuits so that if both brake circuits are operational, there is no impact on the second piston.

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2. The combined valve of claim 1 further comprising an exhaust valve in the housing located for operative engagement with the second piston.

5           3. The combined valve of claim 1 wherein the second piston and the exhaust valve are normally disposed in spaced relation and engage one another in response to pressure in the control port.

10           4. The combined valve of claim 3 wherein the second piston and the exhaust valve are spaced from one another when the primary circuit is inoperative.

15           5. The combined valve of claim 1 wherein in response to failure of the primary brake circuit, there is no pressure on one side of the second piston and the second piston is separated from the exhaust valve permitting pressure from the spring brakes to be modulated and used to control the primary brake circuit.

20           6. The combined valve of claim 1 wherein in response to failure of the secondary circuit, a greater amount of pressure is supplied to the spring brake.

25           7. The combined valve of claim 6 wherein the second piston sealingly engages the exhaust valve and urges it further from its seat allowing an increased pressure flow between the supply and delivery ports.

30           8. The combined valve of claim 1 wherein if the primary and secondary brake circuits are operational,

there is no modulation of the pressure at the delivery port.

9. The combined valve of claim 1 further  
5 comprising a first spring urging the first piston toward  
abutting engagement with the second piston.

10. The combined valve of claim 1 further  
comprising a biasing spring for urging the second piston  
10 from disengagement with the exhaust valve.

11. The combined valve of claim 1 further  
comprising a biasing member operatively associated with  
the exhaust valve for urging the exhaust toward a seated  
15 position to preclude communication between the supply  
port and the delivery port.

12. The combined valve of claim 1 further  
comprising an anti-compounding feature that provides  
20 pressure to the spring brake during normal service  
braking when the spring brake is applied during a park  
application.

13. The combined valve of claim 12 wherein the  
25 anti-compounding feature routes a portion of the primary  
brake circuit pressure to the first piston.

14. A spring brake modulating relay valve for an  
air brake system comprising:

a housing having a supply port, delivery port, exhaust port, control port primary brake circuit port, and secondary brake circuit port; and

- 5 a valve assembly received in the housing and movable in response to air pressure provided to selective ports in the housing, the valve assembly including a relay piston in selective communication with the control port and the primary brake circuit port, a modulating piston having surfaces selectively
- 10 pressurized by the primary brake circuit port and the secondary brake circuit port to modulate pressure from the delivery port thereby selectively applying the associated spring brakes if a failure is detected at the primary brake circuit port, and an exhaust member that
- 15 selectively controls communication between the supply and delivery ports.

15. The spring brake modulating relay valve of claim 14 wherein the relay piston and the modulating piston are operatively connected via biasing members that urge the pistons to move together as a unit and allow relative movement therebetween in response to pressure conditions.

- 25 16. The spring brake modulating relay valve of claim 14 wherein the exhaust member is urged toward a closed position that precludes communication between the supply and delivery ports.

- 30 17. The spring brake modulating relay valve of claim 14 wherein the primary brake circuit communicates

with the relay piston in the absence of pressure at the control port to provide an anti-compounding feature to the valve.